

## SPECIFICATION

## STRIKER

## 5 FIELD OF THE INVENTION

[0001]

The present invention relates to a striker, namely, the present invention relates to a striker for locking two members with each other by engagement of the striker with a hook, wherein the striker and the hook are fixed to the two members, respectively. The striker devised according to the present invention is used for locking, for instance, a car door to a car body.

## 15 BACKGROUND OF THE INVENTION

[0002]

Figures 6A and 6B show two conventional strikers, respectively.

The striker shown in Figure 6A includes a mounting plate portion 121 which is fixed to a car body and a base plate portion 122 which is formed (bent) upright relative to the mounting plate portion 121 by a bending process. A rod-like portion 123 is formed at one end (the right end as viewed in Figure 6A) of the base plate portion 122 by making a through-hole 122 in the base plate portion 122 so

that the rod-like portion 123 is used as an engaging portion engageable with a groove of an associated hook.

[0003]

The striker shown in Figure 6B includes two base plate portions 222 and 222' which overlie each other and a rod-like portion 223 which is formed at one end (the upper end as viewed in Figure 6B) of each of the two base plate portions 222 and 222' by making a through-hole 229 in the two base plate portions 222 and 222', so that the rod-like portion 223 is used as an engaging portion engageable with a groove of an associated hook. The two base plate portions 222 and 222' are formed upright relative to two mounting plate portions 221 and 221' of the striker, respectively, by a bending process. In addition, the two base plate portions 222 and 222' are not separate plate members; the two base plate portions 222 and 222' are formed by bending a seamless plate along a portion thereof which is formed as the aforementioned rod-like portion 223.

[0004]

Although substantially the same as the striker shown in Figure 6B, a striker having two base plate portions (which respectively correspond to the two base plate portions 222 and 222') which are formed from separate plates is known in the art (this type of striker is disclosed in, e.g., Japanese unexamined patent publication

H07-229345). In this conventional striker, the two separate plates that overlie each other are fixed to each other by spot welding.

[0005]

5 To engage and disengage the striker with/from the groove of the associated hook smoothly, it is desirable that the rod-like portion be rounded off and have a large thickness (e.g., 3 to 7 millimeters, desirably 4 to 6 millimeters depending on factors such as the inner diameter  
10 of the groove of the associated hook). Namely, it is desirable that the rod-like portion have a round shape such as a circular shape in cross section (section taken along a plane orthogonal to the direction of the length of the rod-like portion) and that the rod-like portion have a large  
15 thickness (diameter).

#### DISCLOSURE OF THE INVENTION

#### PROBLEM TO BE OVERCOME BY THE INVENTION

[0006]

20 In the striker shown in Figure 6A, the base plate portion 122 only has a thickness of a single plate, and accordingly, the rod-like portion 123 only has a thickness of a single plate. Therefore, it is impossible for the rod-like portion 123 to be formed so as to have the  
25 aforementioned large thickness and to have a circular shape

in cross section. Note that an increase in thickness of the base plate portion 122 causes other problems such as an increase in weight and an increase in production cost, and therefore cannot be adopted.

5 [0007]

In the striker shown in Figure 6B, the two base plate portions 222 and 222' are made by overlaying two plate portions on each other, and accordingly, the rod-like portion 223 can be formed to have the aforementioned large 10 thickness and a round shape such as a circular shape in cross section. However, since the two base plate portions 222 and 222' have the two mounting plate portions 221 and 221', respectively, there are problems with the striker being heavy and having a production cost. Additionally, 15 since the direction of bending the mounting plate portion 221 and the base plate portion 222, the direction of bending the two base plate portions 222 and 222', and the direction of bending the base plate portion 222' and the mounting plate portion 221' are mutually different, it is 20 quite difficult to carry out these three bending operations successively.

[0008]

In the striker disclosed in Japanese unexamined patent publication H07-229345, there is no such difficulty in 25 bending; however, the problem of the striker being heavy

still remains. Moreover, there is another problem with the manufacturing process of this striker being complicated and costly because an additional manufacturing operation, i.e., a spot welding operation, needs to be carried out.

5 Accordingly, a problem in production of the striker also exists.

[0009]

The present invention provides a low-cost striker which has the aforementioned thickness (e.g., 3 to 7 10 millimeters, desirably 4 to 6 millimeters, depending on factors such as the inner diameter of the groove of the associated hook), and a round shape such as a circular shape in cross section, via a simple manufacturing operation with no substantial increase in weight of the 15 striker.

#### MEANS TO OVERCOME THE PROBLEM

[0010]

According to an aspect of the present invention, a 20 striker is provided for locking two members with each other by engagement of the striker with a groove of a hook, wherein the striker is fixed to one of the two members and the hook is rotatably fixed to the other of the two members, the striker including a mounting plate portion fixed to the 25 one of the two members; a base plate portion which is

formed so as to extend perpendicular to the mounting plate portion by a bending process along a bend line; and a folded-back plate portion which is formed by folding over an extended portion, extending from one end of the base 5 plate portion in a direction of the bend line, onto the opposite side of the base plate portion from the mounting plate portion side, so that the extended portion overlies the base plate portion. The base plate portion is positioned closer to the hook than the folded-back plate 10 portion. A through-hole is formed in the base plate portion and the folded-back plate portion, which overlie each other, so that a folded end portion between the base plate portion and the folded-back plate portion defines a rod-like portion serving as an engaging portion engageable 15 with a groove of the hook.

[0011]

Furthermore, according to another aspect of the present invention, a striker is provided for locking two members with each other by engagement of the striker with a 20 groove of a hook, wherein the striker is fixed to one of the two members and the hook is rotatably fixed to the other of the two members, the striker including a mounting plate portion fixed to the one of the two members; a base plate portion which is formed so as to extend perpendicular 25 to the mounting plate portion by a bending process along a

bend line; and a rod-like portion which is formed by folding over an extended portion, extending from one end of the base plate portion in a direction of the bend line, onto the opposite side of the base plate portion from the 5 mounting plate portion side, so that the folded over the extended portion defines a folded-back plate portion. The base plate portion is positioned closer to the hook than the folded-back plate portion. A through-hole is formed in the base plate portion so as to define the rod-like portion, 10 the rod-like portion serving as an engaging portion engageable with a groove of the hook.

[0012]

It is desirable that a first portion of a cross section of the rod-like portion at the folded end portion 15 which is taken along a plane orthogonal to the direction of the length of the rod-like portion be greater in length than a second portion of the same cross section of the rod-like portion, wherein the first portion and the second portion are located on the base-plate-portion side and the 20 folded-back-plate-portion side, respectively.

#### EFFECT OF THE INVENTION

[0013]

According to the present invention, by the adoption of 25 a metal plate having a normal thickness (normal thickness

for the production of strikers, e.g., 3 millimeters) as an unprocessed plate material, a low-cost striker which has the aforementioned thickness and a round shape such as a circular shape in cross section can be achieved via a simple manufacturing operation with no substantial increase in weight of the striker. Moreover, by positioning the center of rotation of the hook on the mounting plate portion side, a base-plate portion of the striker, the distance of which from the center of rotation of the hook being short, can be made so as to come in contact with a leg portion of the hook (one of the leg portions which is pressed by the rod-like portion upon disengagement of the hook from the striker). Namely, the force exerted on the rod-like portion from the hook can be received by the base-plate portion of the striker, the distance of which from the center of rotation of the hook is short, and accordingly, the force exerted on the striker from the hook in the case where the force is exerted on the striker via the base-plate portion can be made smaller than in the case where the force is exerted on the striker via a folded-back plate portion of the striker. Therefore, the folded-back plate portion of the striker can be prevented from coming off the base plate portion. Furthermore, a reaction force (i.e., the force continuously exerted on a ratchet which locks the hook) when the engagement of the hook with the

ratchet is disengaged by an operation of a door handle, or the like, can be reduced.

#### BRIEF DESCRIPTION OF THE DRAWINGS

5 [0026]

Figure 1 is a perspective view of an embodiment of a striker and a hook engageable with the striker, showing a positional relationship therebetween;

10 Figure 2 is a perspective view of the striker shown in Figure 1, viewed from the opposite side;

Figure 3A is a schematic plan view of portions of the striker and the hook which are shown in Figure 1 in a state before the striker and the hook are engaged with each other;

15 Figure 3B is a schematic plan view of portions of the striker and the hook which are shown in Figure 1 in a state where the striker and the hook are engaged with each other;

Figure 4A is a plan view of the striker shown in Figure 1, viewed from above the striker shown in Figure 1;

20 Figure 4B is a side view of the striker shown in Figure 1, viewed in the direction of an arrow B shown in Figure 4C;

Figure 4C is a front view of the striker shown in Figure 1, viewed in the direction of an arrow C shown in

25 Figure 4A;

Figure 4D is an enlarged view of a portion of the striker shown in Figure 1, viewed in the direction of an arrow D shown in Figure 4C;

Figure 5 is a perspective view of another embodiment 5 of the striker and the hook engageable with the striker, showing a positional relationship therebetween;

Figure 6A is a perspective view of a conventional striker; and

Figure 6B is a perspective view of another 10 conventional striker.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0014]

An embodiment of a striker according to the present 15 invention will be hereinafter discussed with reference to Figures 1 through 4D. These drawings are schematic views illustrating the relative location between a hook 5 and a striker 2, and the force exerted on the striker 2 and a rod-like portion 23 thereof, so that the shapes of the 20 hook 5 and the striker 2 shown in the drawings are different from the actual shapes thereof to some degree.

Firstly, the relationship between the striker 2 and the hook 5 will be discussed hereinafter.

[0015]

25 The striker 2 can be brought into engagement with

the hook 5 by moving the striker 2 into the hook 5 in the direction of an arrow A shown in Figures 1 and 3A, and further moving the striker 2 in the same direction while pressing a rear leg portion 51 of the hook 5 so that the 5 hook 5 rotates in the direction of an arrow B to thereby engage the striker 2 in a groove (portion between the rear leg portion 51 and a front leg portion 52) of the hook 5. In a state where the striker 2 and the hook 5 are engaged with each other, the hook 5 is engaged with a 10 ratchet (not shown) to be locked and held in this engaged state thereby. Additionally, in this engaged state, the striker 2 continuously exerts a force on the hook 5 due to a reaction force of a weather strip (not shown). In practice, the striker 2 does not move toward the hook 5 15 (in the direction of the arrow A) but the hook 5 moves toward the striker 2 (in the direction opposite to the direction of the arrow A). Upon the ratchet and the hook 5 being disengaged from each other by an operation of a door handle or the like, the hook 5 returns to its 20 original position by the biasing force of a spring (not shown), thereby making it possible to disengage the hook 5 from the striker 2.

[0016]

The structure of the striker 2 will be discussed 25 hereinafter.

As shown in the drawings, the striker 2 is provided with a mounting plate portion 21, a base plate portion 22, a rod-like portion 23, a folded-back plate portion 24, and a through-hole 29.

5 [0017]

The mounting plate portion 21 is fixed to one of two members (e.g., a member on a car body) by bolts through two holes 21a and 21b formed on the mounting plate portion 21. The other of the two members to which 10 the hook 5 is fixed is, e.g., a member on a car door.

[0018]

The base plate portion 22 is formed (bent) upright relative to the mounting plate portion 21 by a bending process. Although the bend line between the mounting 15 plate portion 21 and the base plate portion 22 serves as a border line therebetween, the bend line is not shown in Figure 2 because the bend of the striker 2 between the mounting plate portion 21 and the base plate portion 22 does not have a sharp angle.

20 [0019]

The folded-back plate portion 24 is formed by folding over an extended portion which extends from one end of the base plate portion 22 (the right end as viewed in Figure 1, the left end as viewed in Figure 2 or the 25 right end as viewed in Figures 4A and 4C) in a direction

of the aforementioned bend line on the opposite side of  
the base plate portion 22 from the mounting plate portion  
(21) side so that the extended portion overlies the base  
plate portion 22. In all of the drawings, the folded-  
5 back plate portion 24 is shown as that which has been  
formed by folding over the aforementioned extended  
portion.

[0020]

The through-hole 29 is formed (punched) by a hole-  
10 press operation with the base plate portion 22 and the  
folded-back plate portion 24 overlaid on each other so that  
the folded end portion (the right end portion as viewed in  
Figure 4C) between the base plate portion 22 and the  
folded-back plate portion 24 remains as the rod-like  
15 portion 23. The rod-like portion 23 is used as an engaging  
portion engageable with the hook 5.

[0021]

The rod-like portion 23 is formed so that a cross  
sectional shape thereof is substantially circular as shown  
20 in Figures 3A and 3B, and so that a base-plate portion 23a  
of the rod-like portion 23, which was continuous with the  
base plate portion 22 (i.e., shared the same surface)  
before the formation of the through-hole 29, becomes  
radially longer in cross section than a folded-back plate  
25 portion 23b of the rod-like portion 23, which was

continuous with the folded-back plate portion 24 before formation of the through-hole 29.

[0022]

Accordingly, in a state where the rod-like portion 23  
5 has moved to the hook 5 in the direction of the arrow A to be engaged therewith, the base-plate portion 23a is in contact with the front leg portion 52 of the hook 5 while undergoing a force from the hook 5. In other words, the base-plate portion 23a exerts a force on the hook 5.

10 [0023]

The force exerted on the striker 2 from the hook 5 (i.e., the force exerted on the hook 5 by the striker 2) in the case where the force is exerted on the striker 2 via the base-plate portion 23a is smaller than that in the case 15 where the force is exerted on the striker 2 via the folded-back plate portion 23b because the distance between a center of rotation C of the hook 5 and the base-plate portion 23a is shorter than the distance between the center of rotation C of the hook 5 and the folded-back plate 20 portion 23b.

[0024]

Accordingly, the striker 2 can secure a sufficient strength without being formed with a mounting plate portion such as the mounting plate portion 221' shown in Figure 6B. 25 Moreover, the folded-back plate portion 24 can be

prevented from coming off the base plate portion 22 even if the folded-back plate portion 24 is not fixed to the base plate portion 22 by welding or adhering. Accordingly, the folded-back plate portion 24 can be provided only for the 5 purpose of achieving the rod-like portion 24 having a circular shape in cross section with a required thickness while securing a sufficient thickness of the rod-like portion 23. For instance, another embodiment of a striker 12 shown in Figure 5 is different from the striker 2 in 10 that the striker 12 is provided with only the rod-like portion 23 and no folded-back plate portion corresponding to the folded-back plate portion 24 that lies on the base plate portion 22, , even though the striker 12 is the same as the striker 2 in that an extended portion, which extends 15 from one end of the base plate portion 22 in the direction of the aforementioned bend line, is folded over. To make a through-hole 119 in the striker 12, the base plate portion 22 only needs to be formed (punched) by a hole-press operation, which facilitates manufacture of the striker 12.

20 [0025]

Furthermore, since the force exerted on the hook 5 from the striker 2 by reaction force of the aforementioned weather strip (not shown) to prevent backlash between the striker 2 and the hook 5 when the striker 2 and the hook 5 25 are engaged with each other is reduced, the force necessary

for disengaging the ratchet which engages with the hook 5 to lock the same from the hook 5 by an operation of a door handle or the like (not shown) can be a relatively small force. Namely, the reaction force of the door when the 5 door is pulled open can be reduced.